

REMARKS

This communication is responsive to the Office action dated October 8, 2004. It is being filed within two months of the mailing date of the final action. In the Office action, the Examiner allowed claims 2-4 and 7-16. Claims 1 and 6 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,182,996 to Spence ("Spence"). Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Spence in view of U.S. Patent No. 4,647,879 to Vaddiparty ("Vaddiparty"). Finally, claims 17-20 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims.

In view of the above amendments and the remarks below, applicants respectfully request entry of the above amendments, reconsideration of the application under 37 C.F.R. § 1.111, and allowance of the pending claims. With entry of the above amendments, claims 1-20 remain in the application. Claims 1 and 6, the claims from which objected-to claims 17-20 depend, are amended. These amendments are made in response to a telephonic interview conducted between Examiner Kimberly Glenn and the undersigned attorney or record. These amendments are intended to put the claims in condition for allowance. An explanation for the reason for not presenting the amendments earlier is presented in the discussion below.

Rejections under 35 USC § 102

In the Office action, claims 1 and 6 were rejected under 35 U.S.C. § 102(b) as being anticipated by Spence. Applicants respectfully traverse the rejection.

In the previous amendment, claim 1 was amended to state that the “N second transmission lines [are] electrically isolated from the first transmission line.” The applicants stated that Spence disclosed transmission lines that were not and could not be isolated to properly function. The term “isolated” was used based on a definition of the term used in the art, as defined in The New IEEE Standard Dictionary of Electrical and Electronics Terms, a copy of which is attached. This definition states that “isolated” means “physically separated, electrically and mechanically, from all sources of electrical energy.” On the contrary, the term “insulated”, the term used in the Office Action to reject the claims, is defined in the same dictionary as “separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.” Thus, in the applicants’ understanding, the term isolated meant isolated from electrical energy, a condition that a dielectric does not provide.

During the telephonic interview, Examiner Glenn stated that she considered the terms “insulate” and “isolate” to be synonymous based on a definition given in Webster’s dictionary. The undersigned has an unabridged copy of Webster’s dictionary that does indeed define “isolate” as “insulate.”

Applicants did not earlier use the term shielded because the term isolated

was considered to convey a very similar meaning. The applicants submit that the IEEE dictionary provides a more accurate definition of terms used by those skilled in the art of making power dividers, than does the Webster's dictionary. However, in order to avoid confusion, applicants now request replacement of the term "isolated" with the term "shielded" in claim 1, to make the meaning more clear. In the IEEE dictionary mentioned above, an electromagnetic shield is defined as a "housing, screen, or other object, usually conducting, that substantially reduces the effect of electric or magnetic fields on one side thereof, upon devices or circuits on the other side." Also, a shielded transmission line is defined as a "transmission line surrounded by a sheath of conducting material to protect it from the effects of external fields, or to confine fields produced by the transmission line."

This use of the term shielded is supported in the original specification by the statement in the paragraph beginning on page 6 and amended above, which states in part, "the impedance of a coaxial conductive path can be controlled by the spacing between a center conductor and a shielding conductor. Thus, the shape and size of the first conductor 36 and passage 30 defines the spacing between the shielding outer conductor 42 and the surface of the center conductor 36 to provide an impedance match between the RF input connector 34 and the impedance at the common node 50." The term "shielding" has been added as a further modifier simply to carry forward the use of the term in the previous sentence.

Additionally, the paragraph of the specification on page 4 that is amended above, states that the “RF connector 34 carries a first conductor 36 that passes through central passage 30. As will be apparent, the conductor 36 and the portions of the body 12 surrounding the passage 30 constitute a coaxial RF signal path, shown generally at 38, in the form of a transmission line 40. One transmission line end 40(1) is connected to connector 34 and another end 40(2) corresponds with body second end 18. The portion of the body forming passage 30, identified as an outer conductor 42, functions as a signal-return conductor that correspondingly shields conductor 36.” The added phrase is simply a statement of a characteristic of a coaxial RF signal path in the form of transmission line 40. Again, the IEEE dictionary defines a coaxial transmission line as a “transmission line consisting of two essentially concentric cylindrical conductors.” Further, a coaxial cable is variously defined as a “two-conductor, concentric (center conductor and shield), constant-impedance transmission line.” Thus, it is well known in the art that a coaxial transmission line has a center conductor and a coaxial, surrounding shield. The added terms are intended to more clearly provide support for the use of the term shielded in the claims, although support was literally and inherently already present.

Claim 1 is now clearly distinguishable from Spence. Spence explicitly discloses “a housing,” which “can be any uniform hollow shape.” (col. 5, ll. 4-5). Also, transmission lines may “be disposed in any arrangement” within the housing “so long as the appropriate ends of inner conductors are available at the

two openings of the housing.” (col. 7, ln. 67 to col. 8, ln. 2) Thus, the housing of Spence through which all of the transmission lines extend is hollow, and Spence does not disclose or suggest shielding any of the transmission lines relative to any other of the transmission lines. This is reinforced by the description at column 4, starting at line 67, where the housing is described as specifically creating an electrical shield, but only between the combination of inner transmission lines (within the housing) and the outside electrical environment. The abstract states that “the power splitter utilizes n number $\lambda/4$ inner conductors disposed in a $\lambda/4$ housing, which provides a common electromagnetic shield.” Further, as stated in column 4, line 67 to column 5, line 3 with reference to FIG. 1, “Housing 16 must provide a shield against electromagnetic energy between inner conductors 12 and 14 and the outside electrical environment. Housing 16 cannot produce an electromagnetic shield between inner conductor 12 and inner conductor 14.” (Underlining added) Thus, the only conclusion is that none of the transmission lines in the common housing are electrically shielded and specifically cannot be electrically shielded.

Thus, the applicants submit that claim 1 is not anticipated by Spence, and is in condition for allowance. Claim 6 is dependent from and contains all the limitations of claim 1, and thus is also in condition for allowance. Additionally, claim 6 is amended to specifically state that the body is electrically conductive and forms a separate conductor for ~~conductor of~~ each of the first and second transmission lines. This feature is clearly not shown by Spence, and in fact,

Spence teaches against such a configuration.

Rejection under 35 USC § 103

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Spence in view of Vaddiparty. The applicants respectfully traverse the rejection. Claim 5 is dependent from and has all the limitations of claim 1, and is distinguishable from the cited art for the same reasons that claim 1 is distinguishable, as discussed above, as well as the reasons presented previously.

Objections To Claims 17-20

Applicants acknowledge the Examiner's allowance of the subject matter of these claims, independent of the allowability of claims 1 and 6 from which they depend. With entry of the above amendments to and allowance of claims 1 and 6, claims 17-20 will also be in condition for allowance. Accordingly, no amendments have been made to these claims.

Reasons for Allowance

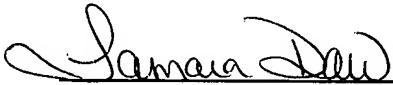
Applicants agree with the Examiner's conclusions regarding the patentability of the allowed claims, without necessarily agreeing with or acquiescing in the Examiner's reasoning. In particular, applicants believe that the claims are allowable because the prior art fails to teach or suggest the invention as claimed, independent of how the invention is paraphrased.

With entry of the above amendments, the applicants believe that this application is now in condition for allowance. Accordingly, the applicants

respectfully request that the Examiner issue a Notice of Allowance covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, it is requested that the undersigned attorney of record be contacted at the telephone number noted below.


CERTIFICATE OF MAILING

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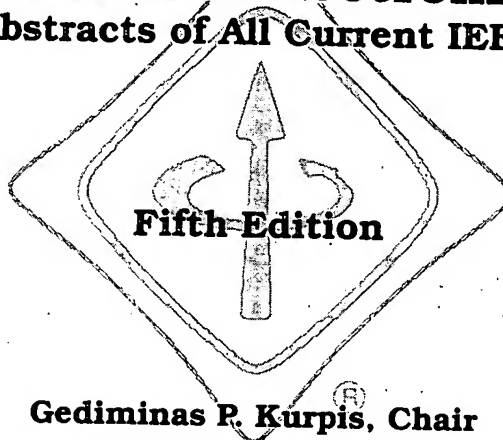

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**The New IEEE Standard Dictionary
of Electrical and Electronics Terms**
[Including Abstracts of All Current IEEE Standards]



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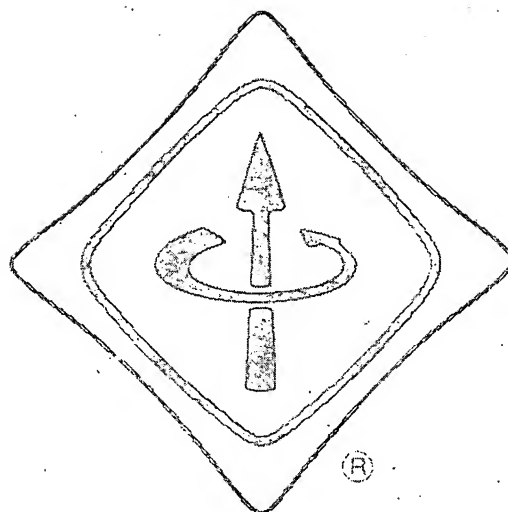
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**The New
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The New IEEE Standard Dictionary of Electrical and Electronic Terms defines over 30,000 terms from every field of electronics, and computer science used throughout industry. Moreover, it now includes abstracts of IEEE standards providing a wealth of information on IEEE standards found in any other source.

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IEEE

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coaxial antenna. An antenna comprised of a quarter-wavelength extension to the inner conductor of a coaxial line and a radiating sleeve which in effect is formed by folding back the outer conductor of the coaxial line for approximately one-quarter wavelength. *See: antenna.* 145-1983

coaxial cable (1) (medium attachment units and repeater units). A two-conductor (center conductor, shield system), concentric, constant-impedance transmission line used as the trunk medium in the baseband system. 8802-3:1990

(2) (local and metropolitan area networks). A two-conductor, concentric (center conductor and shield), constant-impedance transmission line. 802.3b,c,d,e-1989

(3) (broadband local area networks). A cable with two conductors where one completely surrounds the other. Coax cables are unbalanced transmission lines that have an outer conductor that shields the center conductor from electrostatic interference. The two conductors are spaced by an insulating dielectric that, depending on the mechanical and material configuration, affects the speed, attenuation, and impedance of transmission. 802.7-1989

coaxial cable interface (medium attachment units and repeater units). The electrical and mechanical interface to the shared coaxial cable medium either contained within or connected to the medium attachment unit (MAU). *Syn: medium dependent interface (MDI).* 802.3-1985, 8802-3:1990

coaxial cable section. A single length of coaxial cable terminated at each end with a BNC male connector. Cable sections are joined to other cable sections via BNC plug/receptacle barrel or Type T adapters. 8802-3:1990

coaxial cable segment (medium attachment units and repeater units). A length of coaxial cable made up from one or more coaxial cable sections and coaxial connectors, and terminated at each end in its characteristic impedance. 8802-3:1990

coaxial conductor. An electric conductor comprising outgoing and return current paths having a common axis, one of the paths completely surrounding the other throughout its length. 54-1955w

coaxial detector (germanium gamma-ray detectors). A semiconductor radiation detector in which all or part of the two electrical contacts are substantially coaxial. Typically one end of each contact configuration is closed (closed-end coaxial detector), but both ends may be open (open-end coaxial detector). 325-1986

coaxial line. *See: coaxial.*

coaxial pair. *See: coaxial.*

coaxial relay. A relay that opens and closes an electric contact switching high-frequency current as required to maintain minimum losses. *See: relay.* 341

coaxial stop filter (electromagnetic compatibility). A tuned movable filter set round a conductor in order to limit the radiating length of the conductor for a given frequency. *See: electromagnetic compatibility.* [53], [70]

coaxial stub. A short length of coaxial that is joined as a branch to another coaxial. *Note:* Frequently a coaxial stub is short-circuited at the outer end and its length is so chosen that a high or low impedance is presented to the main coaxial in a certain frequency range. *See: waveguide.* [119]

coaxial switch. A switch used with and designed to simulate the critical electric properties of coaxial conductors. 346

coaxial transmission line (waveguide). A transmission line consisting of two essentially concentric cylindrical conductors. 146-1980w

co-channel interference. Interference caused in one communication channel by a transmitter operating in the same channel. *See: radio transmission.* [34]

cocktail shaker sort. An exchange sort in which adjacent pairs of items are compared and exchanged, if necessary, and alternate passes through the set proceed in opposite directions. *Contrast with: bubble sort.* 610.5-1990

CODASYL. Acronym for **Conference on Data Systems Languages.** An organization that establishes standards for database structures. 610.5-1990

CODASYL database. A database that adheres to the standards established by the Database Task Group of CODASYL. *Note:* A network database is generally accepted to be synonymous with a CODASYL database. 610.5-1990

CODASYL model. A network database model defined by the CODASYL organization. The CODASYL model is based on sets that are used to specify associations between different record types that exist in a database. *Syn: flex model.* 610.5-1990

CODASYL set. *See: set.* 610.5-1990

code (1) (microprocessor object modules). Data or executable machine code. *See: absolute code; relocatable code.* 695-1985

(2) (electronic computers). (A) The characters or expressions of an originating or source language, each correlated with its equivalent expression in an intermediate or target language, for example, alphanumeric characters correlated with their equivalent six-bit expressions in a binary machine language. *Note:* For punched or magnetic tape; a predetermined arrangement of possible locations of holes or magnetized areas and rules for interpreting the

- instrument landing system (1) (general).** A generic term for a system which provides the necessary lateral, longitudinal and vertical guidance in an aircraft for a low approach or landing. *See:* ILS. 686-1982
- (2) (ILS).** An internationally adopted instrument landing system for aircraft, consisting of a very-high frequency localizer, an ultra-high-frequency glide slope, and 75-megahertz markers. *See:* instrument landing system reference point. [42]
- instrument landing system marker beacon (electronic navigation).** *See:* boundary marker; navigation.
- instrument landing system reference point (electronic navigation).** A point on the centerline of the instrument landing system runway designated as the optimum point of contact for landing; in standards of the International Civil Aviation Organization this point is from 500 to 1000 feet from the approach end of the runway. *See:* navigation. [42]
- instrument multiplier.** A particular type of series resistor that is used to extend the voltage range beyond some particular value for which the instrument is already complete. *See:* auxiliary device to an instrument; voltage-range multiplier (recording instrument). [102]
- instrument relay.** A relay whose operation depends upon principles employed in measuring instruments such as the electrodynamic meter, iron vane, D'Arsonval galvanometer, and moving magnet. *See:* relay. [87]
- instrument shunt (direct current instrument shunts).** A particular type of resistor designed to be connected in parallel with the measuring device to extend the current range beyond some particular value for which the instrument is already complete. 316-1971w
- instrument switch (power switchgear).** One used to connect or disconnect an instrument, or to transfer it from one circuit or phase to another. Examples: ammeter switch; voltmeter switch. C37.100-1981
- instrument terminals (direct current instrument shunts).** Those terminals which provide a voltage drop proportional to the current in the shunt and to which the instrument or other measuring device is connected. 316-1971w
- instrument transformer (1) (instrument transformer).** A transformer that is intended to reproduce in its secondary circuit, in a definite and known proportion, the current or voltage of its primary circuit with the phase relations substantially preserved. C57.13-1978
- (2) (power and distribution transformer).** A transformer which is intended to reproduce in its secondary circuit, in a definite and known proportion, the current or voltage of its primary circuit, with the phase relations and waveform substantially preserved. *See:* continuous-thermal-current rating factor (RF); transformer correction factor; true ratio; marked ratio; ratio correction factor (RCF); percent ratio; percent ratio correction of an instrument transformer; phase angle of an instrument transformer; phase-angle correction factor; polarity; secondary winding of an instrument transformer; excitation losses for an instrument transformer; voltage transformer; cascade-type voltage transformer; insulated-neutral terminal type voltage transformer; double-secondary voltage transformer; fused-type voltage transformer; turn ratio of a voltage transformer; thermal burden rating of a voltage transformer; rated voltage of a voltage transformer; rated secondary voltage; current transformer; bushing-type current transformer; double-secondary current transformer; multiple-secondary current transformer; multi-ratio current transformer; window-type current transformer; wound-type current transformer; three-wire type current transformer; rated current; rated secondary current; turn ratio of a current transformer. C57.12.80-1978
- instrument transformer—accuracy class.** The limits of transformer correction factor, in terms of percent error, that have been established to cover specific performance ranges for line power factor conditions between 1.0 and 0.6 lag. C12.1-1981
- instrument transformer—accuracy rating for metering.** The accuracy class, together with a standard burden for which the accuracy class applies. C12.1-1981
- instrument-transformer correction factor (watt meter or watthour meter).** *See:* transformer correction factor.
- instrument transformer, dry-type.** *See:* dry-type.
- instrument transformer, liquid-immersed.** *See:* liquid-immersed.
- instrument transformer, low-voltage winding.** Winding that is intended to be connected to the measuring or control devices. [57]
- insulated (1) (NESC).** Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current. *Note:* When any object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subjected. Otherwise, it is, within the purpose of these rules, uninsulated. C2-1984
- (2) (electrolytic cell line working zone).** Separated from other conducting surfaces by a dielectric substance or air space permanently offering a high resistance to the passage of current and to disruptive discharge through the substance or space. *Note:* When any object is

said to beA insulated, it is understood to be insulated in a manner suitable for the conditions to which it is subjected. Otherwise, within the purpose of this definition, it is uninsulated. Insulating covering of conductors is one means for making the conductors insulated.

463-1977

(3) (transmission and distribution). Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current. *Note:* When any object is said to be insulated, it is understood to be insulated in a suitable manner for the conditions to which it is subjected. Otherwise, it is, within the purpose of these rules, uninsulated.

C2.2-1960

insulated bearing (rotating machinery). A bearing that is insulated to prevent the circulation of stray currents. *See:* bearing. [9]

insulated bearing housing (rotating machinery). A bearing housing that is electrically insulated from its supporting structure to prevent the circulation of stray currents. *See:* bearing. [9]

insulated bearing pedestal (rotating machinery). A bearing pedestal that is electrically insulated from its supporting structure to prevent the circulation of stray currents. *See:* bearing. [9]

insulated bolt. A bolt provided with insulation.

[119]

insulated cap (separable insulated connectors). An accessory device designed to electrically insulate and shield and mechanically seal a bushing insert or integral bushing. 386-1985

insulated conductor (1) (NESC). A conductor covered with a dielectric (other than air) having a rated insulating strength equal to or greater than the voltage of the circuit in which it is used.

C2-1984

(2) (National Electrical Code). A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation.

[86]

(3) (transmission and distribution). A conductor covered with a dielectric having a rated insulating strength equal to or greater than the voltage of the circuit in which it is used

C2.2-1960

insulated coupling (rotating machinery). A coupling whose halves are insulated from each other to prevent the circulation of stray current between shafts. *See:* rotor (rotating machinery). [9]

insulated flange (piping). Element of a flange-type coupling, insulated to interrupt the electrically conducting path normally provided by metallic piping. *See:* rotor (rotating machinery). [9]

insulated-gate field-effect transistor (IGFET) (metal-nitride-oxide field-effect transistor).

A four-terminal device consisting of two separate areas of one conductivity type called source and drain with a terminal each, separated from each other by a substrate of opposite conductivity type with its terminal and straddled by an electrode with terminal called gate, which is insulated from the silicon by a layer of insulator material, frequently silicon dioxide, called gate. 581-1978w

insulated-gate field-effect transistor (IGFET) symbols (metal-nitride-oxide field-effect transistor). IGFET types may be categorized as memory-nonmemory, enhancement mode-depletion mode, and n-channel-p-channel. Standard symbols for memory transistors do not exist. The diagram below presents the standard electrical symbols for the nonmemory transistors and the symbols used in this standard for memory transistors. The symbols used for the memory transistors must be considered provisional until specific standards have been finalized. 581-1978w

insulated-gate field-effect transistor. *See:* IGFET. 641-1988

insulated image guide. A planar dielectric waveguide composed of one or more dielectric strips of finite width affixed to an extended dielectric layer of lower dielectric constant and finite thickness, attached in turn to an extended conducting ground plane. 1004-1987

insulated joint (1) (conduit). A coupling or joint used to insulate adjacent pieces of conduits, pipes, rods, or bars. 16-1955w

(2) (cable). A device that mechanically couples and electrically insulates the sheath and armor of contiguous lengths of cable. *See:* tower. [10]

insulated-neutral terminal type voltage transformer (instrument transformer). A voltage transformer that has the neutral end of the high-voltage winding insulated from the case or base and connected to a terminal that provides insulation for a lower voltage than required for the line terminal. C57.13-1978

insulated parking bushing (separable insulated connectors). An accessory device designed to electrically insulate and shield and mechanically seal a bushing insert or integral bushing. 386-1985

insulated rail joint. A joint used to insulate abutting rail ends electrically from one another. [119]

insulated splice (power cable joint). A splice with a dielectric medium applied over the connected conductors and adjacent cable insulation. 404-1986

insulated static wire. An insulated conductor on a power transmission line whose primary function is protection of the transmission line from lightning and one of whose secondary function is communications. 599-1985w

isoceraunic map. See: isokeraunic map.
751-1990

isochronous. The time characteristic of an event or signal recurring at known, periodic time intervals. 802.6-1990

isochronous service octet. A single octet of data passed isochronously between the DQDB layer and the isochronous service user (ISU). 802.6-1990

isochronous service user (ISU). The entity that uses the isochronous service provided by the DQDB layer to transfer isochronous service octets over an established isochronous connection. 802.6-1990

isochronous speed governing (gas turbines). Governing with steady-state speed regulation of essentially zero magnitude. [5], 282-1968w

isocom mode (camera tube). A low-noise return-beam mode of operation utilizing only back-scattered electrons from the target to derive the signal, with the beam electrons specularly reflected by the electrostatic field near the target being separated and rejected. See: camera tube. [45]

isoelectric point. A condition of net electric neutrality of a colloid, with respect to its surrounding medium. See: ion. [119]

isokeraunic level (lightning). The average annual number of thunderstorm days. See: direct-stroke protection (lightning). [10]

isokeraunic map. A map showing equal levels of thunderstorm activity. Usually shown in mean annual days of thunderstorm activity. Syn: isoceraunic map. See: keraunic level. 751-1990

isolated (1) (power line maintenance). Physically separated, electrically and mechanically from all sources of electrical energy. Such separation may not eliminate the effects of electrical induction. (2) Not readily accessible to persons unless special means for access are used. 458

(2) (transmission and distribution) (National Electrical Code) (NESC). Not readily accessible to persons unless special means for access are used. C2.2-1960, C2-1984, [86]

(3) (conductor stringing equipment). (A) Physically separated, electrically and mechanically, from all sources of electrical energy. Such separation may not eliminate the effects of electrical induction. (B) An object not readily accessible to persons unless special means for access are used. 524-1980

(4) (electrolytic cell line working zone). An object not readily accessible to persons unless special means for access are used. 463-1977

isolated. (A) Physically separated, electrically and mechanically, from all sources of electrical energy. Such separation may not eliminate the effects of electrical induction. (B) Not readily

accessible to persons unless special means for access are used. 516-1987, 1048-1990

isolated by elevation (NESC). Elevated sufficiently so that persons may safely walk underneath. C2-1984

isolated conductor (ignored conductor). In a multiple-conductor system, a conductor either accessible or inaccessible, the charge of which is not changed and to which no connection is made in the course of the determination of any one of the capacitances of the remaining conductors of the system. 270-1966w

isolated impedance of an array element (antennas). The input impedance of a radiating element of an array antenna with all other elements of the array absent. 145-1983

isolated-neutral system. A system that has no intentional connection to ground except through indicating, measuring, or protective devices of very-high impedance. See: grounded system. [8], [84]

isolated patient lead (health care facilities). A patient lead whose impedance to ground or the power line is sufficiently high that connecting the lead to ground, or to either conductor of the power line, results in current flow in the lead which is below a hazardous limit. [47]

isolated-phase bus (1) (generating station grounding). A metal-enclosed bus in which each phase conductor is enclosed by an individual metal housing separated from adjacent conductor housings by an air space. 665-1987 (2) (power switchgear). One in which each phase conductor is enclosed by an individual metal housing separated from adjacent conductor housings by an air space. Note: The bus may be self-cooled or may be forced-cooled by means of circulating a gas or liquid. C37.100-1981

isolated-plant (electric power). An electric installation deriving energy from its own generator driven by a prime mover and not serving the purpose of a public utility. [119]

isolated power system (1) (health care facilities). A system comprising an isolating transformer or its equivalent, a line isolation monitor and its ungrounded circuit conductors. [47]

(2) (National Electrical Code). A system comprising an isolating transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors. [86]

isolated redundant UPS configuration. Uses a combination of automatic transfer switches and a reserve system to serve as the bypass source for any of the active systems. 241-1990

isolating amplifier (signal-transmission system). See: amplifier, isolating.

isolating contactor (power system device function numbers). A device that is used

rotor
[9]

rated from, a mold. See: **electroforming**. [119]
(4) (**software**). A computer program or routine that provides an interface between the user and a computer system or program.

610.12-1990

shell-form transformer (power and distribution transformer). A transformer in which the laminations constituting the iron core surround the windings and usually enclose the greater part of them.

C57.12.80-1978

Shell's method. See: **diminishing increment sort**.

610.5-1990

Shell sort. See: **diminishing increment sort**.

610.5-1990

shell, stator (rotating machinery). A cylinder in tight assembly around the wound stator core, all or a portion of which is machined or otherwise made to a specific outer dimension so that the stator may be mounted into an appliance, machine, or other end product. See: **stator**.

[9]

shell-type motor. A stator and rotor without shaft, end shields, bearings or conventional frame. Note: A shell-type motor is normally supplied by a motor manufacturer to an equipment manufacturer for incorporation as a built-in part of the end product. Separate fans or fans larger than the rotor are not included. See: **asynchronous machine**.

[9]

sheltered equipment (test, measurement and diagnostic equipment). Equipment so housed or otherwise protected that the extreme of natural and induced environments are partially or completely excluded or controlled. Examples are laboratory and shop equipment, equipment shielded from sun by a canopy or roof, and so forth.

[2]

SHF. See: **super high frequency**.

211-1990

shield (1) (instrumentation cable) (design and installation of cable systems for Class 1E circuits in nuclear power generating stations). Braid copper, metallic sheath, or metallic coated polyester tape (usually copper or aluminum), applied over the insulation of a conductor or conductors for the purpose of reducing electrostatic coupling between the shielded conductors and others that may be either susceptible to, or generators of, electrostatic fields (noise). When electromagnetic shielding is intended, the term electromagnetic is usually included to indicate the difference in shielding requirement and material.

690-1984

(2) (**cable systems in power generating stations**). As normally applied to instrumentation cables, refers to metallic sheath (usually copper or aluminum), applied over the insulation of a conductor or conductors for the purpose of providing means for reducing electrostatic coupling between the conductors so shielded and others which may be susceptible to or which

may be generating unwanted (noise) electrostatic fields. When electromagnetic shielding is intended, the term "electromagnetic" is usually included to indicate the difference in shielding requirements as well as material. To be effective at power system frequencies, electromagnetic shields would have to be made of high-permeability steel. Such shielding material is expensive and is not normally applied. Other less expensive means for reducing low-frequency electromagnetic coupling, as described herein, are preferred.

422-1977

(3) (**power and distribution transformer**). A conductive protective member placed in relationship to apparatus or test components to control the shape of magnitude, or both, of electric or magnetic fields, thereby improving performance of apparatus or test equipment by reducing losses, voltage gradients, or interface.

C57.12.80-1978

(4) (**electromagnetic**). A housing, screen, or other object, usually conducting, that substantially reduces the effect of electric or magnetic fields on one side thereof, upon devices or circuits on the other side. See: **dielectric heating**; **induction heating**; **industrial electronics**; **signal**.

43-1974

(5) (**mechanical protection**) (**rotating machinery**). An internal part used to protect rotating parts or parts of the electric circuit. In general, the word shield will be preceded by the name of the part that is being protected.

[9]

(6) (**magnetrons**). See: **end shield**.

(7) (**induction heating**). A material used to suppress the effect of an electric or magnetic field within or beyond definite regions.

54-1955w

(8) (**metallic conductors**). A housing or other object that substantially reduces the effect of electric or magnetic fields on one side thereof upon devices or circuits on the other side.

[4]

shielded conductor cable. A cable in which the insulated conductor or conductors is/are enclosed in a conducting envelope or envelopes.

30-1937w

shielded ignition harness. A metallic covering for the ignition system of an aircraft engine, that acts as a shield to eliminate radio interference with aircraft electronic equipment. The term includes such items as ignition wiring and distributors when they are manufactured integral with an ignition shielding assembly.

[119]

shielded insulated splice (power cable joint). An insulated splice in which a conducting material is employed over the full length of the insulation for electric stress control.

404-1986

shielded joint. A cable joint having its insulation so enveloped by a conducting shield that substantially every point on the surface of the insulation is at ground potential or at some predetermined potential with respect to ground.

1101

- shielded line.** A planar transmission line whose cross section is completely enclosed within conducting boundaries. 1004-1987
- shielded-loop antenna (probe).** An electrically-small antenna consisting of a tubular electrostatic shield formed into a loop with a small gap, and containing one or more wire turns for external coupling. 145-1983
- shielded pair (signal-transmission system).** A two-wire transmission line surrounded by a sheath of conducting material to protect it from the effects of external fields, or to confine fields produced by the transmission line. See: signal; waveguide. 146-1980w
- shielded strip transmission line.** A strip conductor between two ground planes. Some common designations are: Stripline (trade mark); Tri-plate (trade mark); slab line (round conductor); balanced strip line. See: strip-type transmission line; unshielded strip transmission line. [35]
- shielded transmission line (1) (signal-transmission system).** A transmission line surrounded by a sheath of conducting material to protect it from the effects of external fields, or to confine fields produced by the transmission line. See: signal; waveguide. [43]
- (2) (waveguide).** A transmission line whose elements essentially confine propagated electrical energy to a finite space inside a conducting sheath. 146-1980w
- shielded-type cable.** A cable in which each insulated conductor is enclosed in a conducting envelope so constructed that substantially every point on the surface of the insulation is at ground potential or at some predetermined potential with respect to ground under normal operating conditions. [10]
- shield factor (telephone circuit).** The ratio of noise, induced current, or voltage when a source of shielding is present, to the corresponding quantity when the shielding is absent. See: induction coordination. [119]
- shield grid (gas tubes).** A grid that shields the control electrode in a gas tube from the anode or the cathode, or both, with respect to the radiation of heat and the deposition of thermionic activating material and also reduces the electrostatic influence of the anode. It may be used as a control electrode. See: electrode (electron tube); grid. 161-1971w
- shielding (1) (power cable joint) (screening).** A conducting layer, applied to control the dielectric stresses within tolerable limits and minimize voids. It may be applied over the entire joint insulation, on the tapered insulation ends only, or over irregular conductor or connector surfaces. 404-1986
- (2) (x-radiation limits for ac high-voltage power vacuum interrupters used in power switchgear).** Barrier of attenuating material used to reduce radiation hazards. 553
- shielding angle (1) (of a luminaire) (illuminating engineering).** The angle between a horizontal line through the light center and the line of sight at which the bare source first becomes visible. [126]
- (2) (lightning protection).** The angle between the vertical line through the overhead ground wire and a line connecting the overhead ground wire with the shielded conductor. See: direct stroke protection (lightning). [10]
- shielding effectiveness (1) (electromagnetic compatibility).** For a given external source, the ratio of electric or magnetic field strength at a point before and after the placement of the shield in question. See: electromagnetic compatibility. [53]
- (2) (measurement of shielding effectiveness of shielding enclosures).** The ratio of the signal received (from a transmitter) without the shield, to the signal received inside the shield; the insertion loss when the shield is placed between the transmitting antenna and the receiving antenna. 299-1991
- shielding enclosure.** A structure that protects its interior from the effect of an exterior electric or magnetic field, or conversely, protects the surrounding environment from the effect of an interior electric or magnetic field. A high-performance shielding enclosure is generally capable of reducing the effects of both electric and magnetic field strengths by one to seven orders of magnitude depending upon frequency. An enclosure is normally constructed of metal with provisions for continuous electrical contact between adjoining panels, including doors. 299-1991
- shielding failure (lightning protection).** The occurrence of a lightning stroke that bypasses the overhead ground wire and terminates on the phase conductor. See: direct-stroke protection (lightning). [10]
- shield wire (electromagnetic fields).** A wire employed for the purpose of reducing the effects on electric supply or communication circuits from extraneous sources. See: inductive coordination. [119]
- shift (mathematics of computing).** A displacement of an ordered set of characters one or more places to the left or right. If the characters are the digits of a numeral, a shift may be equivalent to multiplying by a power of the base. See also: arithmetic shift; logical shift. 610.1
- shift character.** A control character that determines the alphabetic or numeric shift of character codes in a message. 610.5-1990
- shift clock (C) (semiconductor memory).** The inputs that when operated in a prescribed

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